## REMARKS

Claims 13-24 and new Claims 25 and 26 are active in the case. Claims 9-11 are withdrawn from consideration. Reconsideration is respectfully requested.

Specification Amendments

Embodiments 1-5 on pages 17-27 and the headings of Tables 1-3 have been amended in the manner indicated so that the indicated abbreviations correspond correctly to the designations used in the claims. No new matter is introduced into the specification by the amendments and entry of the amendments is respectfully requested.

Claim Amendments

The objection to Claims 13 and 19 is obviated by the amendment to each claim in which the term "once" has been changed to one time. Withdrawal of the objection is respectfully requested.

Claims 13 and 19 have also been amended by limiting the crystals obtained by the present method to dopant free crystals of SiC. This fact is evident from the present disclosure which does not teach the presence of a dopant when the SiC is formed from the vapor reactants. Entry of the amendments is respectfully requested.

New Claims 25 and 26 find basis in the disclosure at page 3, paragraph [0007]. Entry of the new claims is respectfully requested.

Invention

One aspect of the present invention is a method of manufacturing a dopant-free single crystal of silicon carbide, by forming a single crystal of silicon carbide on a substrate surface at a temperature of not less than 900° C from an atmosphere containing a silicon carbide feedstock gas comprising at least a silicon source gas and a carbon source gas under the atmospheric condition of the partial pressure (ps) of the silicon source gas being held constant (at ps>0) and the partial pressure of the carbon source gas in the atmosphere repeatedly alternating between state pc1 present at an interval of time (tc1) and the state pc2 present at an interval of time (tc2) until the single crystal of silicon carbide is completely formed, where pc1>pc2 such that the partial pressure ratio (pc1/ps) falls within the range of 1-10 times the attachment coefficient ratio (Ss/Sc) and the partial pressure ratio (pc2/ps) falls within the range of less than once the attachment coefficient ratio (Ss/Sc).

A second aspect of the invention is a method of manufacturing a dopant-free single crystal of silicon carbide on a substrate surface at a temperature of not less than 900° C from an atmosphere containing a silicon carbide feedstock gas comprising at least a silicon source gas and a carbon source gas under the atmospheric condition of the partial pressure (pc) of the carbon source gas being held constant (at pc>0) and the partial pressure of the silicon source gas in the atmosphere repeatedly alternating between state ps1 present at an interval of time (ts1) and the state ps2 present at an interval of time (ts2) until the single crystal of silicon carbide is completely formed, where ps1<ps2 such that the partial pressure ratio (pc/ps1) falls within the range of 1-10 times the attachment coefficient ratio (Ss/Sc) and the partial pressure ratio (pc/ps2) falls within the range of less than once the attachment coefficient ratio (Ss/Sc).

Prior Art Rejection, 35 USC 103(a)

Claims 13-15 and 19-21 stand rejected based on 35 USC 103(a) as obvious over Larkin et al, U. S. Patent 5,709,745. This ground of rejection is respectfully traversed.

Applicants contend that the Larkin et al patent does not suggest the present invention,. Although the Larkin et al patent discloses a CVD method of forming SiC epilayers, such as a pnp SiC product, nevertheless, the method employed, as detailed in Example 11 of the patent, as well as elsewhere, requires the passage of a gas into the manufacturing device that provides the material for the doping of the product with the desired dopant. The present Claims, on the other hand, expressly exclude the presence of a gas in the manufacturing process that would introduce a dopant into the product obtained. Accordingly, one of skill in the art considering the disclosure of the reference would not be led to modify the process disclosed by eliminating the gas component which supplies the dopant for the epitaxially grown product. Clearly, one of skill in the art would **not** be led to the specific Si/C deposition process of the present invention by the disclosure of Larkin et al.

With specific regard to Claims 15 and 21, applicants note that pc2 and ps1 are essentially zero. However, in the process of Larkin et al which produces a pnp SiC single crystal product, it would be necessary that the values of pc2 or ps1 would not be essentially zero.

Although the stated ground of rejection does not mention the Kisielowski et al patent, nevertheless, the Examiner appears to rely upon it. Kisielowski et al is clearly of secondary interest because it only discloses a method of forming gallium nitride films by molecular beam epitaxy and nowhere contains any teaching or suggestion of the conditions of present Claims 13 and 19 of depositing a SiC film on a substrate by a CVD or ALE method. Accordingly,

Kisielowski et al does not overcome the deficiencies of Larkin et al with respect to the claimed description of the method of the present invention.

The Karapiperis et al patent is also of secondary interest to the present invention because it does not teach a method of forming an epitaxial film of SiC, but rather pertains to a method of making a thin layer of at least one monocrystalline semiconductor material with modulation of the composition and/or doping of the layer. The layer is made by conformal selective epitaxy initiated on a monocrystalline seed, using a gas phase, between two confinement layers made of a material distinct from the semiconductor. Such a description has nothing in common with the method embodiments of the present invention. Accordingly, the ground of rejection raised in paragraph 4 of the Office Action is believed overcome and withdrawal of the same is respectfully requested.

Claims 16-17 and 22-23 stand rejected based on 35 USC 103(a) as obvious over Larkin et al, U. S. Patent 5,709,745 in view of Sugiyama et al U. S. Patent 5.964,944. This ground of rejection is respectfully traversed.

The clear and substantial distinction of the present invention over the Larkin et al patent has been discussed above.

The cited Sugiyama et al patent in no way improves upon the deficiencies of Larkin et al. Sugiyama et al discloses a method of producing high purity silicon carbide single crystal by a reacting silicon vapor directly with a carbon-containing gas under a heated atmosphere. As shown in the figure of the patent, silicon is vaporized in a container into which a carbon containing gas is passed. There is no attempt at maintaining the partial pressure of Si in the device constant and certainly no teaching or suggestion of alternating the partial pressures of

carbon containing gas as required by the present claims. Accordingly, because present Claims 16, 17, 22 and 23 require the specific use of the seed crystal prepared by the methods of present Claims 13 and 19, it is clear that the combined references, which do not teach the method by which the seed crystal of the invention is prepared, do not suggest the methods of manufacturing silicon carbide of the rejected claims. Withdrawal of the rejection is respectfully requested.

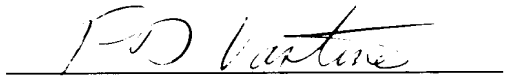
Claims 18 and 24 stand rejected based on 35 USC 103(a) as obvious over Larkin et al, U. S. Patent 5,709,745 in view of Gardener et al U. S. Patent 5.964,944. This ground of rejection is respectfully traversed.

Applicants, in fact, submit that the Larkin et al patent does not teach all of the limitations of present Claim 18, because the seed crystals of these claims rely upon the methods of Claims 13 and 19. Because the seed crystals used in the methods of Claims 18 and 24 are prepared by the distinctly different method of the present invention, the seed crystals of the invention result in a different manufactured composite material in comparison to other known products in which a diamond of gallium nitride structure is formed on a SiC seed crystal. Accordingly, withdrawal of the rejection of these claims is respectfully requested.

It is now believed that the application is in proper condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Norman F. Oblon
Attorney of Record
Registration No.: 24,618

Frederick D. Vastine, Ph.D.
Registration No.: 27,013

22850

TEL: 703-413-3000
FAX: 703-413-2220